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Stormwater and Development: How do New Hampshire's communities address the impacts in the land use planning process?

June Hammond Rowan

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Basic Information

Title:	Stormwater and Development: How do New Hampshire’s communities address the impacts in the land use planning process?
Project Number:	2017NH211B
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Focus Categories:	Management and Planning, Non Point Pollution, Water Quality
Descriptors:	None
Principal Investigators:	June HammondRowan

Publications

There are no publications.

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Annual Report for Project Period March 1, 2017 to February 28, 2017
Project Number: 2017NH211B
PI: June Hammond Rowan

Problem:

Throughout the Unites States, land use in communities is shaped by the decisions made at the local level by Planning Boards or Commissions. Planning Boards have the responsibility to create land use plans and regulations, implement local regulations, and make decisions about applications for development which often result changes in land use and urbanization. When development occurs, there typically is an increase in impervious surfaces which alters stormwater runoff patterns and results in changes to both the hydrology and water quality (EPA, 2016).

Stormwater has long been recognized to be a major cause of nonpoint source pollution and is one of the leading causes of water pollution nationally (DES, 2016). Since the 1980s, efforts have been made to address the impacts of stormwater from development. Government agencies and non-profit organizations provide endless resources aimed at improving how runoff is managed. Much of this effort has been directed at planners and Planning Boards to change the way stormwater is managed at the site scale. Traditionally, stormwater has been managed by moving it off site through engineered systems. Over the past 25 years, techniques such as low impact development, best management practices, smart growth, new urbanism, conservation planning, and green infrastructure have emerged to help treat stormwater on site and control both the quantity and quality of runoff from new development. It is now recognized that stormwater also needs to be managed regionally, typically at the watershed scale.

Municipalities have had years to both recognize the impacts of development on water quantity and quality and find ways to mitigate these impacts. Although efforts have been made to improve watershed planning, in New Hampshire local Planning Boards are our land use decision makers. They make both land use plans and regulations as well as approve applications for development. Stormwater impacts from development are therefore managed locally through the planning process. This project provides a statewide assessment of the local land use plans, policies, and regulations that address the impacts from development on water resources.

Objectives:

The goal of the project is to assess how stormwater is addressed in both Master Plans and land use regulations across New Hampshire. The project objectives are to:

1. Determine what and how New Hampshire municipalities are doing to address stormwater impacts from development in their land use plans and regulations;

2. Assess if and how stormwater management goals are implemented in land use regulations and reveal potential disconnects between plan goals and implementation strategies in protecting water quality and quantity;
3. Identify both commonalities and differences in the ways municipalities are addressing stormwater impacts across New Hampshire to help identify best practices;
4. Share research findings with organizations to enhance state and regional stormwater management efforts; and
5. Provide a Plymouth State University graduate student an opportunity to assist with this research and learn about land use planning.

Methods:

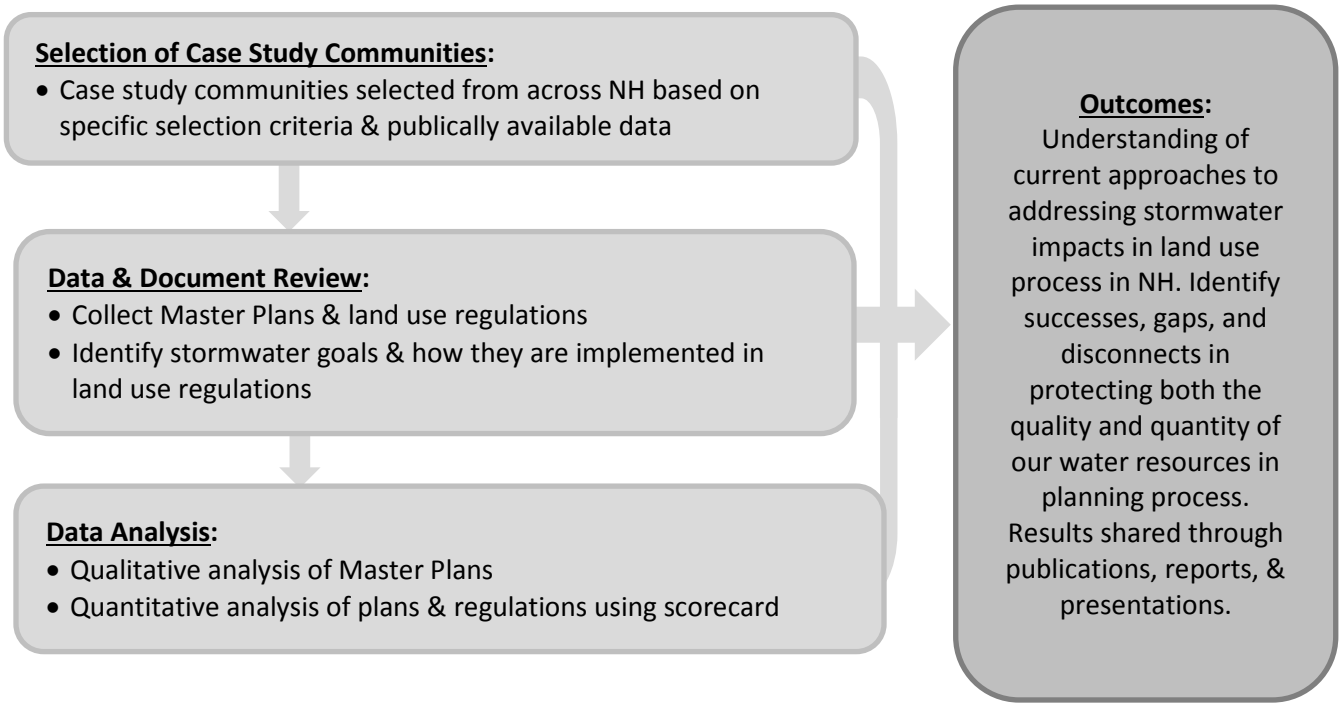
The geographic scope of our research includes case study communities across the State of New Hampshire. A case study research approach is typical in land use planning research. It is used to answer questions involving "how" and "why" leading to insight about our communities while also providing generalizable results (Yin, 1994). 57 municipalities were selected distributed across New Hampshire's nine Regional Planning Commissions. Case study communities were purposely selected in order to gain adequate data and representation across the state. Sample selection criteria included location, size, planning staff in the community, and the quality and availability of data sources.

We collected Master Plans, Subdivision Regulations, Site Plan Review Regulations, and Zoning Ordinances from the case study communities. These documents serve as our data for the study and analysis involves a mixed method approach consisting of:

1. Qualitative analysis: Master Plans and land use regulations are being analyzed to determine the content, themes, similarities and differences across communities regarding stormwater management goals and objectives using NVivo qualitative research software.
2. Quantitative analysis: Each case study community's Master Plan and land use regulations will be scored using a scorecard system adapted from existing stormwater assessment scorecards. Scores will provide a quantitative measure to assess the means and ways communities are addressing stormwater impacts.

Our qualitative analysis allows for a deeper understanding of stormwater management goals across New Hampshire and our quantitative analysis will provide an assessment of what and how our municipalities are doing across the state to manage stormwater in local plans and regulations. The goal is not to compare one municipality to another, but rather to determine the success of the state in implementing stormwater management techniques in the land development process. This approach will highlight communities that may have a disconnect between stormwater goals in their Master Plan and the implementation of these goals in land use regulations. The research methodology is summarized in Figure 1.

Figure 1. Conceptual design of research.



Initial Findings and Significance:

Funds for the project were delayed and not received until August 2017. However, in the spring of 2017, with matching support from Plymouth State University, the selection of case study communities, data collection (Master Plans and land use regulations), and analysis and coding of stormwater related terms in Master Plans was completed. Two graduate students worked on the project in the fall of 2017 focusing on reviewing subdivision and site plan review regulations from case study communities for design standards related to stormwater management. In the winter of 2018, one of the graduate students continued this work focusing on zoning ordinances and how these regulations address stormwater. Analysis is ongoing.

Findings to date indicate that Master Plans do mention stormwater and related terms (see Figure 2.), but, most often, these references are in the context of background information about the topic. Statements about stormwater are vague and general in nature. Master Plans provide limited community based guidance related to stormwater management. Except for suggesting a need for limits to impervious surface, the plans provide few specifics for land use regulations.

The project is continuing analysis of land use regulations and assessing the ways and means communities address stormwater impacts.

Figure 2. Occurrence of Stormwater Related Terms in New Hampshire Master Plans.

Publications and presentations:

Hammond Rowan, June; Jason Spencer and Carolyn Greenough. "How do New Hampshire Communities Address Stormwater in their Master Plans?" Presentation at New Hampshire Water & Watershed Conference, March 23, 2018.

Notable awards and achievements:

Carolyn Greenough, a graduate student who assisted with the research in spring of 2017, completed her MS in Environmental Science and Policy in May 2017. Jason Spencer, a graduate student supported by this project, will complete his MS degree in Environmental Science and Policy in May 2018.

Publications from WRRC supported work completed in previous years and not reported previously:

Not applicable.

Outreach or Information Transferred:

Preliminary findings of this research were presented at the 2018 New Hampshire Water and Watershed Conference on March 28, 2018. This conference is a key event for sharing current water resource information and, in 2018, focused on regional environmental stresses and how we are adapting to new information, emerging issues, and current events affecting water quality and water supply. The event drew 160 attendees from watershed associations, conservation organizations, municipal staff from public works and planning departments, local volunteer Planning Board and Conservation Commission

members, representatives from state and federal agencies, environmental consultants, researchers, educators, and students.

Number of Students Supported:

This project has provided partial direct support for two graduate students in Plymouth State University's MS in Environmental Science and Policy program (Jason Spencer and Nichole Stevens) through support for tuition and a stipend. An additional MS graduate student (Carolyn Greenough) was supported through project matching funds from Plymouth State University.

Faculty Supported:

PI June Hammond Rowan, Research Assistant Professor, was supported by Plymouth State University as financial match to the project.

References Cited:

New Hampshire Department of Environmental Services (DES) 2016 Stormwater Overview. http://des.nh.gov/organization/divisions/water/stormwater/categories/overview.htm

US Environmental Protection Agency (EPA). (2016) Problems with Stormwater Pollution. https://www.epa.gov/npdes/npdes-stormwater-program

Yin, R.K. (1994). *Case study research* (2nd ed.). Thousand Oaks: Sage Publications.